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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/091,772	03/06/2002	Xin Jin	555255012315	6853

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EXAMINER

GHULAMALI, QUTBUDDIN

ART UNIT	PAPER NUMBER
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2611

DATE MAILED: 12/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/091,772

Applicant(s)

JIN ET AL.

Examiner

Qutub Ghulamali

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14-34 is/are allowed.
- 6) ☒ Claim(s) 1-13, 35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. This Office Action is responsive to the Remarks/Amendment filed 09/25/2006.
2. Amendment of claim 14, filed by the applicant, is hereby acknowledged. The amendment overcomes the claim rejection made under 35 U.S.C. 112, 2<sup>nd</sup> paragraph, the rejection is therefore, withdrawn.
3. In view of the explanation provided, the rejection of claims 1, 2, 4 and 10 with reference to 35 U.S.C. 112, first paragraph, is hereby withdrawn.

### *Response to Remarks/Argument*

4. Applicant's remarks see page 10-11, filed 09/25/2006, regarding claims 1, 2, 4 and 10 have been fully considered but is not persuasive.

The applicant alleges that Dabak, does not disclose "calculating an auto-correlation function based on the total sum functions for the first and second sets", and refers to written description on p. 12 of the specification by quoting "After obtaining  $p(t)$  and  $p(t-\zeta)$ , a correlation of the two functions is taken. In a presently preferred embodiment the correlation is calculated by taking an average over time of  $p(t)p^*(t-\zeta)$ , where  $p^*(t-\zeta)$  is the conjugate of  $p(t-\zeta)$  as will be understood by one of skill in the art.", and further goes on to assert that "One of ordinary skill in the art would recognize that correlating a function with its delayed conjugate is correlating the sequence with a phase shift of itself, and is therefore, auto-correlation as opposed to cross-correlation.

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Examiner's response – The examiner carefully reviewed applicant's remarks in light of Dabak's teachings. Dabak, col. 6, lines 10-65, specifically lines 41-65 wherein Dabak discloses (reference figs. 6A and 6B, elements 636, 638) complex conjugates of the input signals, are produced by circuits 636 and 638, at leads 648 and 650 respectively. These input signals and their complex conjugates are multiplied by Rayleigh fading parameter estimate signals and summed as indicated to produce path specific first and second symbol estimates. Therefore, one of ordinary skill in the art would recognize that correlating a function with its delayed conjugate is correlating the sequence with a phase shift of itself, and is therefore, auto-correlation. The examiner concludes that by its own admission and explanation provided by the applicant, a clear and unambiguous path is established showing very similar or substantially the same description regarding auto correlation in Dabak negating to what is described by the applicant "the comparison is made between the two sequences from different sources rather than a shifted copy of a sequence with itself" quoted from "Wireless Communication and Networking". The examiner concludes that the limitation of auto correlation is satisfied by the disclosure in Dabak, the rejection of claims 1, 2, 4 and 10 therefore, is maintained. The rejection follows.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-13 rejected under 35 U.S.C. 102(e) as being anticipated by Dabak et al (US Patent 6,775,260).

Regarding claim 1, Dabak discloses a method of obtaining a frequency error estimate of the difference between a reference frequency and the frequency of a space time transmit diversity signal (fig. 1, elements 102, 100, 104, 106, 108), from first and second received sequences of symbols, transmitted respectively by first and second antennae (ANT 1, ANT 2), where each sequence has two sets of first and second intervals, such that the contents of the second interval of the second received sequence are the additive inverse of the contents of the first interval of the second received sequence comprising:

receiving the first and second sequences of symbols (figs. 1, 5A) (col. 3, lines 52-67; col. 4, lines 5-10);

calculating two sets of first and second partial sums as the sum of the contents of the first and second intervals, respectively, for each set (col. 5, lines 15-20);

calculating total sum functions for the first and second sets by summing the first and second partial sums for each set (col. 5, lines 20-40);

calculating an auto correlation function based on the total sum functions for the first and second sets (col. 5, lines 62-67; col. 6, lines 1-9, 10-33, 41-67); and

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extracting the frequency error estimate from the correlation function (col. 7, lines 45-56; col. 8, lines 16-22).

Regarding claim 2, Dabak discloses the auto correlation function is calculated as a time average of the product of the first total sum function and the conjugate of the second total sum function (col. 6, lines 10-19, 41-67).

Regarding claim 3, Dabak discloses the received symbols are represented by complex numbers (col. 6, lines 41-46).

Regarding claim 4, Dabak discloses extracting includes isolating the imaginary part of the auto correlation function as the frequency error estimate (col. 7, lines 45-56).

Regarding claim 5, Dabak (602) discloses the first and second interval in each set is adjacent (fig. 1, elements T, 2T).

Regarding claim 6, Dabak discloses the first and second sets of intervals are interleaved (rearranged) with each other (col. 5, lines 16-26).

Regarding claims 7-9, Dabak discloses contents of the first and second intervals in each set form a complete symbol (col. 5, lines 17-32).

Regarding claim 10, Dabak discloses adding the auto correlation to a correlation of a second set of total sum functions calculated by summing the first partial sum with the additive inverse of the second partial sum (col. 7, lines 45-67).

Regarding claim 11, Dabak discloses multiplying the frequency error estimate by the average of a signal-to-noise-ratio of the received sequences (fig. 2; col. 4, lines 23-52).

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Regarding claim 12, Dabak discloses altering the reference frequency based on the frequency error estimate to minimize the difference between the reference frequency and the frequency of the space time transmit diversity signal (col. 8, lines 15-25).

Regarding claim 13, Dabak discloses carrying out all of the steps parallel to provide a multitude of diverse correlation functions (see claim 1 above); and combining the multitude of diverse correlation functions to provide the correlation function before extracting the frequency error from the correlation function (see claim 1 above).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dabak et al (US Patent 6,775,260) in view of Hadad (USP. 6,985,432).

Regarding claim 35, Dabak discloses all limitations of the claim, except does not explicitly disclose frequency error is a carrier frequency error and the reference frequency is a receiver reference frequency. Hadad in a similar field of endeavor discloses frequency error is a carrier frequency error and the reference frequency is a receiver reference frequency (col. 1, lines 51-55; col. 14, lines 37-44). It would have

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been obvious to a person of ordinary skill in the art at the time the invention was made to use frequency error as taught by Hadad in the circuit of Dabak because it can mitigate the error between the received signal and the reference signal to provide a correction signal to compensate for error in transmission (shift in frequency) at the receiver.

***Allowable Subject Matter***

9. Claim 14-34 allowed.

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qutub Ghulamali whose telephone number is (571) 272-3014. The examiner can normally be reached on Monday-Friday, 7:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

QG.  
December 6, 2006.

A handwritten signature in black ink, appearing to read 'J. Patel', with a long horizontal line extending to the right.

**JAY K. PATEL**  
**SUPERVISORY PATENT EXAMINER**